

## IMAGES IN CARDIOLOGY .....

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## Utilisation of 3D echocardiography in demonstrating the beneficial effect of bifocal right ventricular cardiac resynchronisation therapy

Cardiac resynchronisation therapy is a well-established treatment for patients with heart failure. It, however, requires very experienced operators and can be time consuming. We present a case where, owing to anatomical difficulties in accessing the coronary sinus left ventricular lead positioning was not possible, but using an alternative site of pacing, the right ventricular outflow tract, improved left ventricular synchrony and ejection fraction were achieved. The benefits were demonstrated by 3D echocardiography, soon after implantation and at late clinic review.

A 70-year-old man was admitted electively for biventricular pacemaker implantation because of symptoms of dyspnoea on exertion, QRS 140 ms with left bundle branch block, ejection fraction 23% and left ventricular end diastolic dimension 57 mm. Medical history included ischaemic heart disease since 1999 and a road traffic accident, which resulted in marked deformity of the thoracic spine.

A left subclavian vein approach was attempted first. However, multiple attempts to cannulate the vein were unsuccessful. Intraprocedural venogram showed occlusion of the left subclavian vein. The right subclavian vein was cannulated successfully and right atrial (lead model Medtronic 5076-52) and ventricular (apical; lead model Medtronic 5076-58) active leads were positioned satisfactorily.

Despite numerous attempts, using various catheters and guiding wires, it was not possible to enter the coronary sinus and position a left ventricular lead.

As there is some evidence to support use of a right ventricular outflow tract (RVOT) position when left ventricular lead positioning is difficult, we elected to use this approach to provide some possible benefit to the patient. A ventricular (lead model Medtronic 5076-58) active lead was positioned in the RVOT. An INSYNC III 8042 (Medtronic) unit was implanted successfully.

Post-implant chest x ray and system check were satisfactory. Tissue Doppler (Philips iE33) and 3D echocardiography (Philips

iE33) studies showed significant improvement not only in the left ventricular ejection fraction compared with baseline but also in the visible left ventricular synchrony (video clip 1A and 1B available online at <http://heart.bmjjournals.com/supplemental>) comparable with placement of a left ventricular lead in the coronary sinus.

Four months later, the ejection fraction with bifocal pacing had improved further to 43.4% (video clip 2C). Interestingly, the ejection fraction with the pacing mode switched off was 32.6% (video clip 2B) and 30.9% with right ventricular apical pacing alone (video clip 2A).

The findings were supportive of a sustained effect of RVOT pacing on ejection fraction and beneficial result on cardiac remodelling.

This case shows the potential benefit of positioning a lead in the right ventricular outflow tract in situations where coronary sinus cannulation proves difficult for left ventricular lead placement.

There may also be wider implications of this approach on service provision for patients requiring biventricular pacemaker. Whether the relatively easy, less time-consuming placement of the left ventricular lead in the RVOT may be as effective as one in the coronary sinus for some patients warrants further investigation.



More information available online at  
<http://heart.bmjjournals.com/supplemental>

J Wojciuk  
S Mohammad  
R More  
G Goode

[dr.wojciuk@bwhospitals.nhs.uk](mailto:dr.wojciuk@bwhospitals.nhs.uk)